Topic: Power rule for fractional powers or radicals

Question: Differentiate the function.

$$f(x) = \sqrt{x}$$

Answer choices:

A $-\frac{1}{2}x^{\frac{1}{2}}$

B $-\frac{1}{2}x^{-\frac{1}{2}}$

C $\frac{1}{2}x^{-\frac{1}{2}}$

D $\frac{1}{2}x^{\frac{1}{2}}$

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Solution: C

To use power rule

$$\frac{d}{dx}x^n = nx^{n-1}$$

on a function with a fractional power or a radical, make sure the exponent is a fraction first, then just apply power rule like normal.

Rewrite the function.

$$f(x) = \sqrt{x}$$

$$f(x) = x^{\frac{1}{2}}$$

Apply power rule.

$$f'(x) = \frac{1}{2}x^{\frac{1}{2}-1}$$

$$f'(x) = \frac{1}{2}x^{-\frac{1}{2}}$$

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Topic: Power rule for fractional powers or radicals

Question: Differentiate the function.

$$f(x) = \frac{4}{\sqrt{x}}$$

Answer choices:

A $-2x^{-\frac{3}{2}}$

B $-2x^{-\frac{1}{2}}$

C $-2x^{\frac{3}{2}}$

D $-2x^{\frac{1}{2}}$

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Solution: A

To use power rule

$$\frac{d}{dx}x^n = nx^{n-1}$$

on a function with a fractional power or a radical, make sure the exponent is a fraction first, then just apply power rule like normal.

Rewrite the function.

$$f(x) = \frac{4}{\sqrt{x}}$$

$$f(x) = \frac{4}{x^{\frac{1}{2}}}$$

$$f(x) = 4x^{-\frac{1}{2}}$$

Apply power rule.

$$f'(x) = 4\left(-\frac{1}{2}\right)x^{-\frac{1}{2}-1}$$

$$f'(x) = -2x^{-\frac{3}{2}}$$

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Topic: Power rule for fractional powers or radicals

Question: Differentiate the function.

$$f(x) = \frac{5}{\sqrt[3]{x^2}}$$

Answer choices:

A $-\frac{10}{3}x^{\frac{5}{3}}$

B $-\frac{10}{3}x^{-\frac{5}{3}}$

C $-\frac{10}{3}x^{-\frac{1}{3}}$

D $-\frac{10}{3}x^{\frac{1}{3}}$

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Solution: B

To use power rule

$$\frac{d}{dx}x^n = nx^{n-1}$$

on a function with a fractional power or a radical, make sure the exponent is a fraction first, then just apply power rule like normal.

Rewrite the function.

$$f(x) = \frac{5}{\sqrt[3]{x^2}}$$

$$f(x) = \frac{5}{x^{\frac{2}{3}}}$$

$$f(x) = 5x^{-\frac{2}{3}}$$

Apply power rule.

$$f'(x) = 5\left(-\frac{2}{3}\right)x^{-\frac{2}{3}-1}$$

$$f'(x) = -\frac{10}{3}x^{-\frac{5}{3}}$$

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